Winnebago Landfill
Northern and Southern Units
Winnebago County, Illinois

Permit Number: 1991-138-LF
Site Number: 2018080001

Alternate Source Demonstration

April 2011

Submitted to:
Illinois Environmental Protection Agency
Bureau of Land
Springfield, Illinois

Prepared for:
Winnebago Landfill
8403 Lindenwood Road
Rockford, Illinois

Prepared by:

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ANDREWS
ENGINEERING, INC.

April 8, 2011

Stephen F. Nightingale
Manager, Permit Section
Bureau of Land
Illinois Environmental Protection Agency
1021 North Grand Ave. East
P.O. Box 19276
Springfield, IL 62794-9276

Re: 2018080001 – Winnebago County
Winnebago Landfill – Northern and Southern Units
Alternate Source Demonstration

Dear Mr. Nightingale:

On behalf of our client, Winnebago Landfill, submitted herein are an original and three copies of an alternate source demonstration in accordance with Condition VIII.15 of Permit No. 1991-138-LF Modification 46. Application forms (LPC-PA1 and Certification of Authenticity) are provided in Appendix A of the application.

Please contact Tom Hilbert at (815) 963-7516 if you have any questions or require additional information.

Sincerely,

Teresa N. Sharp
Environmental Scientist

TNS:bjh:slm

Enclosure(s)

cc: Tom Hilbert – William Charles Waste Companies
Bernie Shorle – US EPA Region 5

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Applications

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1. INTRODUCTION

Condition No. VIII.15 of Permit No. 1991-138-LF Modification No. 46 requires that an alternate source demonstration be conducted for all confirmed monitored increases detected in facility monitoring wells or that an assessment monitoring program be implemented to determine whether the facility is the source of the increases. Exceedences that were observed fourth quarter 2010 were sampled for confirmation during the first quarter 2011 event. This application provides an alternate source demonstration for the fourth quarter 2010 confirmed exceedences. The application forms (Certification of Authenticity and LPC-PA1) are contained in Appendix A.

2. BACKGROUND INFORMATION

2.1 Site Description

The Winnebago Landfill facility contains three separate disposal areas (Northern and Southern Units, and the North Expansion Unit) authorized under Illinois EPA Permit Nos. 1991-138-LF and 2006-221-LF, respectively. A site map has been provided as Figure 1. The Northern Unit ceased accepting waste on September 8, 2000. The Southern Unit continues to operate in accordance with the current permit. In addition, a North Expansion Unit, located between the existing Northern Unit and Baxter Road, began operation under Illinois Permit No. 2006-221-LF on May 16, 2008. This unit is also shown in Figure 1.

2.2 Site Hydrogeological Summary

The site hydrogeologic characteristics have been accurately determined based on implementation of a series of subsurface investigations, beginning with the initial drilling investigation in 1969 by Testing Engineers, Inc. Subsequent investigations have included advancement of borings, well/piezometer installations for the existing site and facility expansion, and comprehensive groundwater quality testing due to releases by Acme Solvents. Additional hydrogeologic information has been gained due to development activities of the North Expansion Unit, which includes excavation of materials exposing bedrock and unconsolidated deposits.

2.2.1 Unconsolidated Deposits

The composition of the unconsolidated deposits, which appear to be glacial outwash, varies with location throughout the facility boundaries. Coarse-grained sand and gravel with occasional silt and/or clay seams typically underlie the Northern Unit. The thickness of the sand and gravel varies from just a few feet beneath the east toe of the waste footprint to approximately 70 feet beneath the western edge of the waste boundary. The sand and gravel thickens to the west, corresponding with the erosion of the underlying dolomite. Unconsolidated sand and gravel glacial drift sediments directly underlay the western portion of the Northern Unit, while fractured dolomite bedrock underlies the eastern portion of the landfill.

2.2.2 Bedrock

The bedrock consists of dolomite, fractured and weathered to varying extents. Chert layers, chert nodules, and small vugs were commonly noted on boring logs. However, larger voids or karst characteristics were not indicated on the boring logs. The bedrock surface is highly variable throughout the facility. East of the site a dolomite bedrock upland is present and outcrops in the vicinity of the Acme Solvent site and two quarries. This bedrock upland

represents the eastern bedrock escarpment of the Upper Rock buried valley. The site is situated on the eastern edge of the Upper Rock buried bedrock valley. The overburden thickens as the elevation of the bedrock surface decreases to the west. As determined by previous boring investigations, and monitor well and gas probe installations, the bedrock varies from a high near 750 feet above mean sea level (MSL) at the southeast corner of the North Unit to a low of approximately 675 feet above MSL to the west and south of the South Unit.

2.2.3 Uppermost Aquifer

The uppermost aquifer for the site is located within the glaciofluvial sand and gravel deposits and the upper portion of the fractured dolomite bedrock. The saturated sands and gravels, which directly overlie the bedrock, occur in the western two-thirds of the Northern Unit. In locations where there are no saturated glaciofluvial deposits, the uppermost aquifer is located within the dolomite bedrock typically overlain by silty clay deposits. This occurs in the eastern third of the Northern Unit.

2.2.4 Groundwater Flow Conditions

The general flow direction within the uppermost aquifer is westward and downward in the bedrock upland east of the site. However, groundwater may flow upward from the bedrock to the unconsolidated sediments in areas where sediments are saturated (HSI GeoTrans, 1995). This is due to the higher permeability of the sand and gravel deposits. Groundwater flow in the unconsolidated sediments is to the west-northwest. Potentiometric surface maps provided in Appendix B indicate groundwater movement is generally west-northwest beneath the Northern Unit. Groundwater elevations obtained from recent monitor wells and piezometers installed west of Kilbuck Creek indicate flow is to the north west of Kilbuck Creek.Shallow groundwater may discharge to Killbuck Creek while groundwater in the lower part of the unconsolidated sediments and deeper bedrock flows beneath Killbuck Creek.

Killbuck creek is both a gaining and losing stream dependent upon hydrogeologic and atmospheric conditions. During drier periods where the water table drops below the bottom of the creek bed, surface waters feed the groundwater system. During wetter periods where the water table is high (above the bottom of the creek bed) the groundwater system will recharge the stream and wetlands. This fluctuation allows mixing of surface water (and, therefore, surface water constituents) with groundwater (and any groundwater constituents) often on a seasonal basis. In addition, dependent upon the creek stage, the surface waters of both the creek and the wetland mitigation area may be contiguous.

The aquifer system beneath the facility, which includes both the saturated sand and gravel and the upper weathered/fractured part of the dolomite, extends to an approximate depth of 665 feet MSL. East of the landfill and beneath the eastern quarter of the Northern Unit, the water table occurs within the dolomite bedrock. Beneath the western three-fourths of the site and within the Killbuck Creek Valley, the water table occurs within the sand and gravel deposits. Previous hydrogeologic investigations and evaluations have shown that vertical gradients do exist within the uppermost aquifer but are typically slight at any individual location. Therefore, groundwater elevations from the bedrock wells and wells screened in the unconsolidated materials (sand and gravel) were used to create one potentiometric surface for each quarterly sampling period. As expected, the hydraulic gradients are greater at the east end of the facility where the bedrock is higher and flat near Killbuck Creek.

3. GROUNDWATER QUALITY

In accordance with 35 Ill. Adm. Code 811.319 and the current permit, the groundwater quality is evaluated on a quarterly basis. Results of the statistical evaluations are reported quarterly in accordance with Condition No. VIII.18. Notification of observed increases/confirmed increases have been submitted in accordance with Condition No. VIII.14 of the permit.

3.1 Existing Monitor Well Network

The facility has an extensive network of monitoring wells from which groundwater data are obtained. Separate monitor well networks exist for the Northern and Southern Units. The Northern Unit contains 23 groundwater monitoring points, of which five are designated as background groundwater quality wells (upgradient), one is a compliance boundary well at the edge of the zone of attenuation and the remaining wells monitor within the zone of attenuation downgradient and sidegradient of the landfill. Winnebago Landfill samples 10 additional wells on a quarterly basis as part of the GMZ monitoring network. Six temporary monitoring wells were installed and sampled from October to December 2009 to monitor the groundwater quality west of the permitted GMZ area. Each of the wells is identified in Figure 1. The following table provides a list of the monitoring wells for the Northern Unit.

Northern Unit Detection Monitoring Wells (23)	
Upgradient	G09D, G09M, G13S, G13D, G20D
Compliance Boundary	R39S
Zone of Attenuation	G03M, G16M, G17S, G18D, G18S, G33D, G34D, G35D, G36S
	G37S, G38S, G40S, G41D, G41M, G41S, R42S, G51S
Northern Unit GMZ Only Wells (10)	
Compliance Boundary	G52S, G52M
Zone of Attenuation	R03S, G16D, G33S, G34S, G35S, G37D, G130, G50S
Northern Unit Temporary Wells (6)	
Zone of Attenuation	T1U-A, T1L-A, T2U-A, T2L-A, T3U-A, T3L-A

The Southern Unit contains 17 permitted groundwater monitoring points. Six are designated as background groundwater quality wells (upgradient); two (G13S and G13D) are also background wells for the Northern Unit. Although, monitoring wells R05S, G29S, and G29D are permitted as zone of attenuation wells, based on the potentiometric surface maps (Appendix B), these wells are also located upgradient to the waste units. The wells have been used previously in the derivation of the background/applicable groundwater quality standards (AGQS) values for the unit. The following table lists the monitoring wells for the Southern Unit.

Southern Unit Detection Monitoring Wells (17)	
Upgradient	R11S, G11D, G13S, G13D, R22S, G22D
Zone of Attenuation	R05S, G23D, R24D, R25D, R27D, R28D, G29S, G29D, G26S, G26D, G49D

3.2 Background Concentrations

The initial background concentrations (AGQSs) for the Northern Unit were determined from data obtained from four wells located east of Lindenwood Road on the Acme Solvent property (B-8, STI-2S, STI-2I, and STI-2D). Background sampling occurred during 1990 through 1992. The

AGQSs were proposed in the initial significant modification application and subsequent addendums. Addendum 3 to the initial significant modification, dated February 10, 1993, provided the first full listing of routine AGQS values derived from wells G09M, G09D, G13S, and G13D. Since the time the background concentrations were obtained, remediation at the Acme Solvent facility ceased and an additional quarry began operation east of Acme Solvents (the facilities are located upgradient to the landfill). The approximate location of Acme Solvents and the quarries are shown in Figure 2. These activities have likely affected the current background conditions. To account for changes in the background groundwater quality since 1993, revised AGQS values for 60 G1 and G2 List parameters were submitted and subsequently approved on March 26, 2004 with the issuance of Modification 24 to the current permit.

The initial AGQSs for the Southern Unit were determined from data obtained from the permitted upgradient/background wells. However, revisions to several background values have included data from wells R05S, G29S, and G29D as part of the statistical derivation. Although permitted as zone of attenuation wells, these wells are actually hydraulically upgradient to the Southern Unit and provide additional information on the background groundwater quality. As mentioned in Section 3.1 above, monitor wells G13S and G13D are contained in the monitor well networks for both the Northern and Southern Units. The groundwater quality for these two wells along with R05S (Southern Unit) and G16D (Northern Unit) are not evaluated with respect to the permitted AGQSs but are reviewed based on trend analyses in accordance with Condition VIII.25 of Permit No. 1991-138-LF (Modification No. 46).

3.3 Confirmed Increases

The table below lists the parameters and wells that have been confirmed to exceed the criteria listed in Condition VIII.13 during the fourth quarter 2010 confirmed sampling event at Winnebago Landfill. The historical sampling results for each of the exceeding wells/parameters are provided as Table 1 and Table 2 for the Northern and Southern Units, respectively. Each confirmed increase is discussed in detail in the sections below. In addition, graphical trend analyses have also been conducted for each of the confirmed exceedences and are provided in Appendix C.

Unit	Well	Location	Confirmed Increases
North	R03S	Downgradient	cis-1,2-dichloroethene
North	G09M	Upgradient	benzene, chlorobenzene
North	R39S	Compliance	cis-1,2-dichloroethene
North	G51S	Downgradient	1,2-dichlorobenzene, cis-1,2-dichlorothene
South	R11S	Upgradient	cis-1,2-dichlorothene
South	R22S	Upgradient	specific conductance
South	R28D	Downgradient	acetone, carbon disulfide

3.3.1 1,2-dichlorobenzene

The fourth quarter 2010 concentration (2 ug/l) of 1,2-dichlorobenzene exceeded the preceding second quarter 2010 concentration (<1 ug/l) at well G51S, and was confirmed first quarter 2011 (1.8 ug/l). However, the detected concentrations were well below the AGQS value (5 ug/L). The parameter 1,2,dichlorobenzene is a chlorinated solvent that is likely associated with the Acme Solvents facility located directly upgradient of Winnebago Landfill. 1,2-dichlorobenzene has also been detected historically at upgradient well G09D (during the 2003, 2004, 2005, 2006, and 2009 second quarter events), which is located between Acme Solvents and the landfill. The

offsite source is affecting the concentrations in both up- and downgradient wells at the landfill facility. The historical detections of 1,2-dichlorobenzene at G09D have been addressed as part of pending Application Log No. 2010-373 (alternate source demonstration). Since concentrations remain below the AGQS value, no further action is necessary for this parameter.

3.3.2 Acetone

The fourth quarter 2010 concentration (5.1 ug/l) of acetone minimally exceeded the preceding second quarter 2010 concentration (<5 ug/l) at well R28D. However, the monitoring well was unable to be sampled during first quarter 2011 for confirmation. Historically, acetone has never been detected at R28D. During the fourth quarter 2010 sampling event, acetone was also detected in upgradient well G13D (8.6 ug/l), the field blank (65 ug/l), and equipment blank (58 ug/l) indicating the detections are not representative of a leachate impact, but likely due to laboratory/sampling contamination. A copy of the laboratory field/equipment blank analytical is provided in Appendix D. The detections of acetone at well R28D are due to laboratory/sampling contamination; therefore no further action is necessary for this parameter.

3.3.3 Benzene

The fourth quarter 2010 concentration (2.2 ug/l) of benzene exceeded the preceding second quarter 2010 concentration (<1 ug/l) at upgradient well G09M, and was confirmed first quarter 2011 (2.3 ug/l). The detected concentrations are below the AGQS/MAPC value (2.8 ug/L). Since well G09M is located upgradient of the landfill and concentrations are below the AGQS/MAPC value, no further action is necessary for this parameter.

3.3.4 Carbon disulfide

The fourth quarter 2010 concentration (3.5 ug/l) of carbon disulfide exceeded the preceding second quarter 2010 concentration (<1 ug/l) at well R28D. As mentioned above, first quarter 2011 results from well R28D are not available for confirmation. Historically, carbon disulfide has never been detected at R28D. During the fourth quarter 2010 sampling event, carbon disulfide was also detected in fifteen other samples. All wells with observed detections were sampled for confirmation (with the exception of R28D) during first quarter 2011. The confirmation results did not confirm the detection of carbon disulfide in any well. The lack of confirmation for the detections observed in the monitoring wells indicates that the fourth quarter 2010 detection of carbon disulfide in well R28D is likely due to laboratory/sampling error. Therefore, no further action is necessary for this parameter.

3.3.5 Chlorobenzene

The fourth quarter 2010 concentration (5.9 ug/l) of chlorobenzene exceeded the AGQS value (5 ug/L) at upgradient well G09M, and was confirmed first quarter 2011 (5.7 ug/l). Along with G09M, chlorobenzene has also been detected historically at upgradient wells G09D, G13D, and G13S. Detections of chlorobenzene at upgradient wells G09D, G13D, and G13S have previously been discussed as part of pending Application Log No. 2010-373. These upgradient wells are located between Acme Solvents and the landfill. Chlorobenzene is an industrial solvent associated with the Acme Solvents; its presence in upgradient groundwater indicates it is attributable to the Acme Solvents facility and not the landfill. Therefore no further action is necessary for this parameter.

A complete reevaluation of the background groundwater quality for the Northern Unit has been proposed as part of pending application Log No. 2010-038 (GMZ investigation report). Concentrations of chlorobenzene will be reevaluated at that time and a revised AGQS will likely be proposed to account for the upgradient concentrations of the parameter. Exceedences of chlorobenzene will continue to be reported to the Illinois EPA in accordance with Condition VIII.14 of the permit; however, any additional assessment (i.e., alternate source demonstrations/assessment monitoring required by Condition VIII.15) will be conducted as part of the background reevaluation.

3.3.6 Cis-1,2-dichloroethene

The fourth quarter 2010 concentration of cis-1,2-dichloroethene exceeded the preceding second quarter 2010 concentration at Northern Unit wells R03S, R39S, and G51S, and Southern Unit upgradient well R11S. First quarter 2011 concentrations confirmed the increase in all four wells. However, the increased concentrations, which range from 1.1 ug/l to 1.9 ug/l, are well below the AGQS value (5 ug/l). Cis-1,2-dichloroethene is a chlorinated solvent which has historically been detected in many of the upgradient wells (G09M, G11D, R11S, G13D, G13S, and G20D), including fourth quarter 2010 (G11D, R11S, G13S, and G20D), with the highest concentration (11 ug/l) recorded at G20D. Upgradient well G20D is the closest well to the Acme Solvents property. The concentrations detected in downgradient wells R03S, R39S, and G51S appear directly related to concentrations detected in the upgradient wells. The presence of cis-1,2-dichloroethene in the upgradient groundwater indicates it is attributable to the Acme Solvents facility and not the landfill. Therefore no further action is warranted for this parameter.

3.3.7 Specific conductance

Specific conductance at upgradient well R22S exceeded the AGQS value (2,030 umhos/cm) during fourth quarter 2010 (3,210 umhos/cm) and was confirmed first quarter 2011 (3,330 umhos/cm). As shown by the graph in Appendix C, the overall trend for specific conductance at R22S is sporadic. Historically, specific conductance first exceeded the AGQS value during third quarter 2001, prior to waste placement in the Southern Unit (first quarter 2002 for Cell 3). This along with the upgradient position of the well, indicates that the elevated specific conductance concentrations are not related to waste disposal activities but to spatial variability. As discussed in previous applications (including recent Log Nos. 2007-012, 2008-070, and 2010-152), R22S monitors a lithologic setting significantly different from the rest of the Southern Unit wells. Well R22S screens a silty lens within a clay wedge while all other Southern Unit wells screen aerially extensive sand and gravel deposits. To account for the spatial variability at this location, an intrawell AGQS value of 3,330 umhos/cm is proposed for specific conductance at R22S. The statistical method and intrawell calculations are provided in Appendix E and Appendix F, respectively.

4. RECOMMENDATIONS AND CONCLUSIONS

Based on an evaluation of the historic sampling results, trend analyses, groundwater flow direction, and background information, the confirmed increases are not associated with the landfill but appear to be related to upgradient groundwater quality, temporal/spatial variability, and laboratory/sampling contamination. An intrawell value has been proposed (3,300 umhos/cm) for specific conductance at R22S to address the spatial variability of the screened interval. No further action or assessment is required for any of the remaining subject

parameters. This alternate source demonstration fulfills the requirements of Condition No. VIII.15 of Permit No. 1991-138-LF Modification No. 46.

TABLES

Table 1
Winnebago Landfill - Northern Unit Analytical

Well ID	Parameter	Units	GW List	AGQS	2ndQtr97	2ndQtr98	2ndQtr99	2ndQtr00	2ndQtr01	2ndQtr02	2ndQtr03	2ndQtr03re	2ndQtr04
G51S	1,2-Dichlorobenzene	ug/l	G2	5									
G09M	Benzene	ug/l	G2	2.8	< 2	< 2	< 1	< 1	< 1	< 1	< 1		< 1
G09M	Chlorobenzene	ug/l	G2	5	< 5	< 5	< 1	< 1	< 1	< 1	< 1		< 1
G51S	cis-1,2-Dichloroethene	ug/l	G2	5									
R03S	cis-1,2-Dichloroethene	ug/l	G2	5	< 5	< 5	2.7	< 1	< 1	< 1	2	1	1
R39S	cis-1,2-Dichloroethene	ug/l	G2	5									

Well ID	Parameter	Units	GW List	AGQS	2ndQtr05	2ndQtr06	2ndQtr06re	2ndQtr07	2ndQtr07re	2ndQtr08	4thQtr08	1stQtr09	2ndQtr09
G51S	1,2-Dichlorobenzene	ug/l	G2	5									< 1
G09M	Benzene	ug/l	G2	2.8	< 1	< 1		< 1		1	< 1		< 1
G09M	Chlorobenzene	ug/l	G2	5	1	2	< 1	2		3	2.2		< 1
G51S	cis-1,2-Dichloroethene	ug/l	G2	5									< 1
R03S	cis-1,2-Dichloroethene	ug/l	G2	5	3	2		3	< 1	1	2	1.6	1.6
R39S	cis-1,2-Dichloroethene	ug/l	G2	5									< 1

Well ID	Parameter	Units	GW List	AGQS	4thQtr09	2ndQtr10	4thQtr10	1stQtr11
G51S	1,2-Dichlorobenzene	ug/l	G2	5	< 1	< 1	2	1.8
G09M	Benzene	ug/l	G2	2.8	< 1	< 1	2.2	2.3
G09M	Chlorobenzene	ug/l	G2	5	1.4	< 1	5.9	5.7
G51S	cis-1,2-Dichloroethene	ug/l	G2	5	< 1	< 1	1.9	1.2
R03S	cis-1,2-Dichloroethene	ug/l	G2	5	1.5	< 1	1.5	1.1
R39S	cis-1,2-Dichloroethene	ug/l	G2	5	< 1	< 1	1.2	1.4

Note:
A highlighted cell indicates an exceedence of the AGQS/MAPC value.
Andrews Engineering, Inc.

Table 2
Winnebago Landfill -Southern Unit Analytical

Well ID	Parameter	Units	GW List	AGQS	2ndQtr98	1stQtr99	2ndQtr99	3rdQtr99	4thQtr99	1stQtr00	2ndQtr00	3rdQtr00	4thQtr00
R22S	Specific Conductance (field)	umhos	G1	2029.99		1220	1290	1430	1849	132	2008	792	1482
R28D	Acetone	ug/l	G2	100			< 5				< 5		
R28D	Carbon disulfide	ug/l	G2	5			< 1				< 1		
R11S	cis-1,2-Dichloroethene	ug/l	G2	5	< 5		8.6				10		

Well ID	Parameter	Units	GW List	AGQS	1stQtr01	2ndQtr01	3rdQtr01	4thQtr01	1stQtr02	2ndQtr02	3rdQtr02	4thQtr02	1stQtr03
R22S	Specific Conductance (field)	umhos	G1	2029.99	1542	1332	2780	620	1140	950	1230	1230	1290
R28D	Acetone	ug/l	G2	100		< 5				< 10			
R28D	Carbon disulfide	ug/l	G2	5		< 1				< 1			
R11S	cis-1,2-Dichloroethene	ug/l	G2	5		6.1				6			

Well ID	Parameter	Units	GW List	AGQS	2ndQtr03	2ndQtr03re	3rdQtr03	4thQtr03	1stQtr04	2ndQtr04	2ndQtr04re	3rdQtr04	3rdQtr04re
R22S	Specific Conductance (field)	umhos	G1	2029.99	1190		1290	1140	1470	1360	1720	1680	1640
R28D	Acetone	ug/l	G2	100	< 10					< 10			
R28D	Carbon disulfide	ug/l	G2	5	< 1					< 1			
R11S	cis-1,2-Dichloroethene	ug/l	G2	5	6	6	5	4	4	5		7	

Well ID	Parameter	Units	GW List	AGQS	4thQtr04	1stQtr05	1stQtr05re	2ndQtr05	3rdQtr05	3rdQtr05re	4thQtr05	4thQtr05re	1stQtr06
R22S	Specific Conductance (field)	umhos	G1	2029.99	1300	970	1860	1450	1960	1910	1366	1572	1055
R28D	Acetone	ug/l	G2	100				< 10					
R28D	Carbon disulfide	ug/l	G2	5				< 1					
R11S	cis-1,2-Dichloroethene	ug/l	G2	5				5					

Well ID	Parameter	Units	GW List	AGQS	1stQtr06re	2ndQtr06	3rdQtr06	3rdQtr06re	4thQtr06	1stQtr07	1stQtr07re	2ndQtr07	2ndQtr07re
R22S	Specific Conductance (field)	umhos	G1	2029.99	1313	1778	1610	1650	1046	1984	1735	1422	
R28D	Acetone	ug/l	G2	100		< 10						X< 10	
R28D	Carbon disulfide	ug/l	G2	5		< 1						X< 1	
R11S	cis-1,2-Dichloroethene	ug/l	G2	5		< 1						5	4

Well ID	Parameter	Units	GW List	AGQS	3rdQtr07	4thQtr07	4thQtr07re	1stQtr08	1stQtr08re	2ndQtr08	3rdQtr08	4thQtr08	1stQtr09
R22S	Specific Conductance (field)	umhos	G1	2029.99	992	1485	1782	2565	1235	564	810	715	1747
R28D	Acetone	ug/l	G2	100						< 10		< 10	
R28D	Carbon disulfide	ug/l	G2	5						< 1		< 1	
R11S	cis-1,2-Dichloroethene	ug/l	G2	5						3		2.8	

Well ID	Parameter	Units	GW List	AGQS	2ndQtr09	3rdQtr09	4thQtr09	1stQtr10	2ndQtr10	3rdQtr10	4thQtr10	1stQtr11
R22S	Specific Conductance (field)	umhos	G1	2029.99	2710	749	938	1571	3200	1209	3210	3330
R28D	Acetone	ug/l	G2	100	< 5		< 5		< 5		5.1	
R28D	Carbon disulfide	ug/l	G2	5	< 1		< 1		< 1		3.5	
R11S	cis-1,2-Dichloroethene	ug/l	G2	5	2.8		1.6		1.3		1.8	1.8

Note:
A highlighted cell indicates an exceedence of the AGQS/MAPC value.
Andrews Engineering, Inc.

FIGURES

File: J:\1990\90-114\DWG\Site Map (01-07-11).dwg Layout: Layout1 User: wulewicz Plotted: Mar 31, 2011 - 3:33 PM

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200 0 200 400 800

SCALE: IN FEET

LEGEND	
SGX	STREAM GAUGE LOCATION
	NORTHERN UNIT GROUND WATER MONITOR WELL OR GMZ WELL
	SOUTHERN UNIT GROUND WATER MONITOR WELL
	CURRENTLY PERMITTED FILL BOUNDARY
	BENCHMARK
	REPLACEMENT MONITORING WELL
	NORTH EXPANSION UNIT MONITORING WELL

NORTH EXPANSION UNIT
(CONSTRUCTION ONGOING)

NORTHERN UNIT

SOUTHERN UNIT

SOUTHERN UNIT EXPANSION

G185 G182 G180 G179 G178 G177 G176 G175 G174 G173 G172 G171 G170 G169 G168 G167 G50S R183 G52S (T4U-A) G52M (T4L-A) G37D G37S G34D G34S G17S G18S G18D G39S G40S G51S G184 G16M G16D G35D G35S SG1 G41M G41D G41S R03S G03M G38S G33S G33D G36S G130 R42S G49D R28D R27D G26S G26D R25D R24D G23D G29D G29S SG3 G09D G09M R05S G20D G13S G13D R11S G11D R22S G22D

ENERGY RECOVERY PLANT AND OFFICE BUILDING

FIRE PROTECTION POND

GAS PROCESSING BUILDING

WINNEBAGO LANDFILL PROPERTY BOUNDARY

LINDENWOOD ROAD

COMMONWEALTH EDISON R.O.W.

KILBUCK CREEK

KILBUCK CREEK

FIG. 1

SITE MAP

PLANS PREPARED FOR
WINNEBAGO LANDFILL
ROCKFORD, WINNEBAGO COUNTY, ILLINOIS

DATE: DECEMBER 2010
PROJECT ID: 90-114
SHEET NUMBER:

ANDREWS ENGINEERING, INC.
3300 Ginger Creek Drive, Springfield, IL 62711-7233
Tel (217) 787-2334 Fax (217) 787-9495
Pontiac, IL • Naperville, IL • Indianapolis, IN • Warrenton, MO

APPROVED BY: MTH | DESIGNED BY: MTH | DRAWN BY: MPN

REVISIONS

NO.	DATE	DESCRIPTION	BY

LEGEND

- - - CURRENTLY PERMITTED FILL BOUNDARY

NOTE:
BACKGROUND IMAGE EXTRACTED FROM GOOGLE EARTH, APRIL 23, 2006.

N

250 0 250 500 1000

SCALE: IN FEET

REVISIONS			
NO.	DATE	DESCRIPTION	BY
1	5/11/10	ADDED COORDINATE SYSTEM GRID	KEV

ANDREWS
ENGINEERING, INC.
3300 Ginger Creek Drive, Springfield, IL 62711-7233
Tel (217) 787-2334 Fax (217) 787-9495
Pontiac, IL • Naperville, IL • Indianapolis, IN • Warrenton, MO

APPROVED BY: TNS DESIGNED BY: TNS DRAWN BY: MPN

SITE LOCATION MAP

PLANS PREPARED FOR
WINNEBAGO LANDFILL
ROCKFORD, WINNEBAGO COUNTY, ILLINOIS

DATE: AUGUST 2010

PROJECT ID: 90-114

SHEET NUMBER:

FIG. 2

APPENDIX A

APPLICATION FORMS

Illinois
Environmental
Protection Agency

Bureau of Land
1021 North Grand Avenue East
Box 19276
Springfield, IL 62794-9276

Certification of Authenticity of Official Forms

This form must accompany any application submitted to the Illinois EPA Bureau of Land, Division of Land Pollution Control, Permit Section on forms other than the official copy printed and provided by the Illinois EPA. The only allowed changes to the form are in spacing, fonts, and the addition of the information provided. Any additions must be underlined. The forms would not be considered identical if there is any change to, addition or deletion of words on the form or to the language of the form.

The same individuals that sign the application form it accompanies must sign the following certification.

I hereby certify under penalty of law that I have personally examined, and am familiar with the application form or forms and all included supplemental information submitted to the Illinois EPA herewith, and that the official Illinois Environmental Protection Agency application form or forms used herein is or are identical in all respects to the official form or forms provided by the Illinois EPA Bureau of Land Permit Section, and has not or have not been altered, amended, or otherwise modified in any way. I further certify under penalty of law that any attached or included electronic data version of the application form or forms complies with the official Illinois EPA's Electronic version thereof, and is or are identical in all respects to the official electronically downloadable form or forms provided by the Illinois EPA Bureau of Land Permit Section, and has not or have not been altered, amended or otherwise modified in any way.

By: _____ 3-1-2011
Owner Signature (date)

Esincering Manager
Title

By: _____ 3-1-2011
Operator Signature (date)

Esincering Manager
Title

_____ 4/4/2011
Engineer Signature (date)
(if necessary)

Subscribed and Sworn to Before Me,
a Notary Public in and for the
above-mentioned County and State.

OFFICIAL SEAL
NICOLE M ROTE
NOTARY PUBLIC, STATE OF ILLINOIS
MY COMMISSION EXPIRES 08/12/12

_____
Notary Public

My Commission Expires: 8/12/12 [Notary Seal]

Illinois Environmental Protection Agency

Bureau of Land • 1021 N. Grand Avenue E. • Box 19276 • Springfield • Illinois • 62794-9276

General Application for Permit
(LPC - PA1)

This form must be used for any application for permit, except for landscape waste composting or hazardous waste management facilities regulated in accordance with RCRA, Subtitle C from the Bureau of Land. One original, and two copies, or three if applicable, of all permit application forms must be submitted. Attach the original and appropriate number of copies of any necessary plans, specifications, reports, etc. to fully support and describe the activities and modifications being proposed. Attach sufficient information to demonstrate the compliance with all regulatory requirements. Incomplete applications will be rejected.

Niote: Permit applications which are hand-deliverd to the Bureau of Land, Permit Section must be delivered to the above address between 8:30 am and 5:00 pm, Monday through Friday (excluding State holidays).

NOTE: Please complete this form online, save a copy locally, print and submit it to the Permit Section #33, at the above address.

I. Site Identification:

Site Name: Winnebago Landfill IEPA ID Number: 2018080001

Street Address: 8403 Lindenwood Road P.O. Box: _____

City: Rockford State: IL Zip Code: 61109 County: Winnebago

Existing DE/OP Permit Numbers (if applicable): 1991-138-LF _____ _____

2. Owner/Operator Identification:

Owner		Operator	
Name:	Winnebago Landfill Company, LLC	Name:	Winnebago Reclamation Service, Inc.
Street Address:	5450 Wansford Way, Suite 201B	Street Address:	5450 Wansford Way, Suite 201B
PO Box:		PO Box:	
City:	Rockford State: IL	City:	Rockford State: IL
Zip Code:	61109 Phone:	Zip Code:	61109 Phone:
Contact:	Tom Hilbert	Contact:	Tom Hilbert
Email Address:	thilbert@wcwastecompanies.com	Email Address:	thilbert@wcwastecompanies.com

TYPE OF SUBMISSION/REVIEW PERIOD:		TYPE OF FACILITY:		TYPE OF WASTE:	
New Landfill/180 days (35 IAC Part 813)	☐	Landfill	☑	General Municipal Refuse	☑
Landfill Expansion/180 days (35 IAC Part 813)	☐	Land Treatment	☐	Hazardous	☐
Sig. Mod. to Operate/90 days (35 IAC Part 813)	☐	Transfer Station	☐	Special (Non-Hazardous)	☑
Other Sig. Mod./90 days (35 IAC Part 813)	☑	Treatment Facility	☐	Chemical Only (exec. putrescible)	☐
Renewal of Landfill/90 days (35 IAC Part 813)	☐	Storage	☐	Inert Only (exec. chem. & putrescible)	☐
Developmental/90 days (35 IAC Part 807)	☐	Incinerator	☐	Used Oil	☐
Operating/45 days (35 IAC Part 807)	☐	Composting	☐	Potentially Infectious Medical Waste	☐
Supplemental/90 days (35 IAC Part 807)	☐	Recycling/Reclamation	☐	Landscape/Yard Waste	☐
Permit Transfer/90 days (35 IAC Part 807)	☐	Other (Specify)	☐	Other (Specify)	☐
Renewal of Experimental Permit (35 IAC Part 807)	☐				

3. Description of this Permit Request:

Alternate source demonstration in accordance with Condition VIII.15 (Modification No. 46).

4. Completeness Requirements

The following items must be checked Yes, No or N/A. Each item will be reviewed for completeness by the log clerk. Blank items will result in rejection of the application. Please refer to the instructions for further guidance.

1. Have all required public notice letters been mailed in accordance with the LPC-PA16 instructions? ☑ Yes ☐ No ☐ N/A

(If so, provide a list of those recipients of the required public notice letters for Illinois EPA retention. Such retention shall not imply any Illinois EPA review and/or confirmation of the list.)

Public Notice Recipients

Name: Dave Syverson Title: Senator - District 34
Street Address: 200 South Wyman Street, Suite 302 P.O. Box:
City: Rockford State: IL Zip Code: 61101 Phone:

Name: Charles Jefferson Title: Representative - District 67
Street Address: 200 South Wyman Street, Suite 304 P.O. Box:
City: Rockford State: IL Zip Code: 61101 Phone:

Name: Phillip Nicolosi Title: State's Attorney
Street Address: 400 West State Street P.O. Box:
City: Rockford State: IL Zip Code: 61101 Phone:

Name: Scott Christiansen Title: County Chairman
Street Address: 404 Elm Street, Room 504 P.O. Box:
City: Rockford State: IL Zip Code: 61101 Phone:

Name: Village of New Milford Title: Village Clerk
Street Address: 6771 11th Street P.O. Box:
City: Rockford State: IL Zip Code: 61109 Phone:

Name: Village of Davis Junction Title: Village Clerk
Street Address: 106 North Elm Street P.O. Box: 207
City: Davis Junction State: IL Zip Code: 61020 Phone:

Name: Cherry Valley Township Title:
Street Address: 487 South Blackhawk Road P.O. Box:
City: Rockford State: IL Zip Code: 61109 Phone:

2. a. Is the Siting Certification Form (LPC-PA8) completed and enclosed? ☐ Yes ☐ No ☑ N/A

b. Is siting approval currently under litigation? ☐ Yes ☑ No ☐ N/A

3. a. Is a closure, and if necessary a post-closure plan covering these activities being submitted, or ☐ Yes ☑ No ☐ N/A

   b. has one already been approved? If yes, provide the permit number: 1991-138-LF

4. a. For waste disposal sites, only: Has any employee, owner, operator, officer or director of the owner or operator had a prior conduct certification denied, canceled or revoked? ☐ Yes ☑ No ☐ N/A

   b. Have you included a demonstration of how you comply or intend to comply with 35 Ill. Adm. Code 745? ☐ Yes ☐ No ☑ N/A

5. a. Is land ownership held in beneficial trust? ☐ Yes ☑ No ☐ N/A

   b. If yes, is a beneficial trust certification form (LPC-PA9) completed and enclosed? ☐ Yes ☐ No ☑ N/A

6. a. Does the application contain information or proposals regarding the hydrogeology; groundwater monitoring, modeling or classification; a groundwater impact assessment; or vadose zone monitoring for which you are requesting approval? ☑ Yes ☐ No ☐ N/A

   b. If yes, have you submitted a third copy of the application (4 total) and supporting documents? ☑ Yes ☐ No ☐ N/A

5. Signatures:

Original signatures are required. Signature stamps or applications transmitted electronically or by FAX are not acceptable.

All applications shall be signed by the person designated below as a duly authorized representative of the owner an/or operator.

Corporation - By a principal executive officer of the level of vice-president or above.
Partnership or Sole Proprietorship - By a general partner or the proprietor, respectively.
Government - By either a principal executive officer or a ranking elected official.

A person is a duly authorized representative of the owner and operator only if:

1. They meet the criteria above or the authorization has been granted in writing by a person described above; and
2. Is submitted with this application (a copy of a previously submitted authorization can be used).

I hereby affirm that all information contained in this application is true and accurate to the best of my knowledge and belief. I do herein swear that I am a duly authorized representative of the owner/operator and I am authorized to sign this permit application form.

Any person who knowingly makes a false, fictitious, or fraudulent material statement, orally or in writing, to the Illinois EPA commits a Class 4 felony. A second or subsequent offense after conviction is a Class 3 felony. (415 ILCS 5/44(h))

Owner Signature: _____ Date: 3-1-2011

Thomas Hilbert — Printed Name: Engineering Manager — Title:

Notary: Subscribed and Sworn before me this 1st day of March 2011.

My commission expires on: 8/12/12

OFFICIAL SEAL
NICOLE M ROTE
NOTARY PUBLIC, STATE OF ILLINOIS
MY COMMISSION EXPIRES 08/12/12

Signature & Stamp/Seal of Notary Public

Operator Signature: _____ Date: 3-1-2011

Thomas Hilbert — Printed Name: Esineering Manage — Title:

Notary: Subscribed and Sworn before me this 1st day of March 2011.

My commission expires on: 8/12/12

Signature & Stamp/Seal of Notary Public

OFFICIAL SEAL
NICOLE M ROTE
NOTARY PUBLIC, STATE OF ILLINOIS
MY COMMISSION EXPIRES 08/12/12

Engineer's Name: JEREMEY C. POETZSCHER — Engineer's Title: PROJECT ENGINEER

Company: ANDREWS ENGINEERING, INC. — Registration Number: 062-061274

Street Address: 3300 GINGER CREEK DRIVE — PO Box: _____

City: SPRINGFIELD — State: IL — Zip Code: 62711 — Phone: 217-787-2334

Email Address: jpoetzscher@andrews-eng.com — License Expiration Date: 11/30/2011

JEREMEY C. POETZSCHER
062.061274
LICENSED
PROFESSIONAL
ENGINEER
OF
ILLINOIS

Signature: _____ Date: 4/4/2011 — Professional Engineer's Seal:

APPENDIX B

Potentiometric Surface Maps

N

200 0 200 400 800

SCALE: IN FEET

NOTES:
1. CONTOUR INTERVAL = 5 FEET
2. SAMPLE DATES = 1/17/2011 - 1/20/2011.
3. (*) NOT USED IN THE COMPILATION OF THE POTENTIOMETRIC SURFACE.
4. THE NORTHERN AND SOUTHERN UNITS OF WINNEBAGO LANDFILL ARE OPERATED AND MONITORED IN ACCORDANCE WITH ILLINOIS EPA PERMIT NO. 1991-138-LF. THE NORTH EXPANSION UNIT OF WINNEBAGO LANDFILL IS OPERATED AND MONITORED IN ACCORDANCE WITH ILLINOIS EPA PERMIT NO. 2006-221-LF. THE DEPOSITS MONITORED BY ALL THREE WASTE UNITS ARE HYDRAULICALLY CONNECTED; THEREFORE, A SINGLE MAP DEPICTING THE GROUNDWATER FLOW REGIME HAS BEEN COMPILED.
5. IN THE CASE OF NESTED WELLS THE GROUNDWATER ELEVATIONS FROM SHALLOW WELLS WERE USED IN THE COMPILATION OF POTENTIOMETRIC CONTOURS.
6. POTENTIOMETRIC CONTOURS AS SHOWN ASSUME CONTINUOUS GEOLOGICAL CONDITIONS AND DO NOT ACCOUNT FOR LINER AND SIDEWALLS EMPLACED FOR DEVELOPMENT OF THE NORTH EXPANSION UNIT.

LEGEND
- SGX — STREAM GAUGE LOCATION
- NORTHERN UNIT GROUND WATER MONITOR WELL OR GMZ WELL
- SOUTHERN UNIT GROUND WATER MONITOR WELL
- CURRENTLY PERMITTED FILL BOUNDARY
- BENCHMARK
- REPLACEMENT MONITORING WELL
- NORTH EXPANSION UNIT MONITORING WELL

P1 699.11
P2 695.43
P3 698.99
G180 695.80
G179 695.49
G178 695.51
G177 691.06
G176 695.20
G175 695.29
G174 693.95
G173 693.63
G172 691.66
G171 693.30
G170 692.94
G169 693.60
G168 693.64
G167 692.21
G50S DRY
G52S 699.44
G52M 699.42
G185 689.65
G182 698.95
R183 694.93
NORTH EXPANSION UNIT
(CONSTRUCTION ONGOING)
694
WINNEBAGO LANDFILL PROPERTY BOUNDARY
ENERGY RECOVERY PLANT AND OFFICE BUILDING
FIRE PROTECTION POND
G18D 696.31
G18S DRY
G184 697.07
G37S 705.99
G37D 703.08
G17S DRY
GAS PROCESSING BUILDING
G40S DRY
G51S 697.72
G34D 702.54
G34S 704.79
KILDUCK CREEK
R39S 698.82
699
LINDENWOOD ROAD
I = 0.014269
G16M 703.01
G16D 703.17
G35D 703.16
G35S 703.07
G41M 703.29
G41D 702.99
G41S 703.24
R03S 703.41
G03M 703.41
NORTHERN UNIT
704
G33S 705.49
G33D 705.12
G38S 704.22
G09D 718.45
G09M 718.23
R05S 718.63
G20D 719.68
SOUTHERN UNIT EXPANSION
G13S 718.02
G13D 717.50
G36S 706.75
G130 706.99
R42S 708.32
709
G49D 709.63
R11S 715.98
G11D 715.91
MW-25 712.76
SG3
R28D NA
R27D 710.33
G26S 710.70
G26D 710.63
R25D 711.38
SOUTHERN UNIT
R24D *706.08
R22S *727.99
G22D 716.79
714
G23D 713.07
KILDUCK CREEK
G29D 715.12
G29S 713.48
COMMONWEALTH EDISON R.O.W.

1Q11

DATE: FEBRUARY 2011
PROJECT ID: 90-114
SHEET NUMBER:

POTENTIOMETRIC SURFACE MAP
1ST QUARTER 2011

PLANS PREPARED FOR
WINNEBAGO LANDFILL
ROCKFORD, WINNEBAGO COUNTY, ILLINOIS

ANDREWS ENGINEERING, INC.
3300 Ginger Creek Drive, Springfield, IL 62711-7233
Tel (217) 787-2334 Fax (217) 787-9495
Pontiac, IL • Naperville, IL • Indianapolis, IN • Warrenton, MO

APPROVED BY: JLR | DESIGNED BY: JLR | DRAWN BY: MPN

REVISIONS

NO.	DATE	DESCRIPTION	BY

File: J:\1990\90-114\DWG\Annual GW Flow maps\2010PMAPS\4q10 pmap.dwg Layout: Layout1 User: wulewicz Plotted: Mar 31, 2011 - 2:24 PM

E 798,500 E 799,000 E 799,500 E 800,000 E 800,500

N

200 0 200 400 800

SCALE: IN FEET

NOTES:
1. CONTOUR INTERVAL = 5 FEET
2. SAMPLE DATE = 10/8/2010.
3. (*) NOT USED IN THE COMPILATION OF THE POTENTIOMETRIC SURFACE.
4. THE NORTHERN AND SOUTHERN UNITS OF WINNEBAGO LANDFILL ARE OPERATED AND MONITORED IN ACCORDANCE WITH ILLINOIS EPA PERMIT NO. 1991-138-LF. THE NORTH EXPANSION UNIT OF WINNEBAGO LANDFILL IS OPERATED AND MONITORED IN ACCORDANCE WITH ILLINOIS EPA PERMIT NO. 2006-221-LF. THE DEPOSITS MONITORED BY ALL THREE WASTE UNITS ARE HYDRAULICALLY CONNECTED; THEREFORE, A SINGLE MAP DEPICTING THE GROUNDWATER FLOW REGIME HAS BEEN COMPILED.
5. IN THE CASE OF NESTED WELLS THE GROUNDWATER ELEVATIONS FROM SHALLOW WELLS WERE USED IN THE COMPILATION OF POTENTIOMETRIC CONTOURS.
6. POTENTIOMETRIC CONTOURS AS SHOWN ASSUME CONTINUOUS GEOLOGICAL CONDITIONS AND DO NOT ACCOUNT FOR LINER AND SIDEWALLS EMPLACED FOR DEVELOPMENT OF THE NORTH EXPANSION UNIT.

LEGEND

- SGX — STREAM GAUGE LOCATION
- NORTHERN UNIT GROUND WATER MONITOR WELL OR GMZ WELL
- SOUTHERN UNIT GROUND WATER MONITOR WELL
- CURRENTLY PERMITTED FILL BOUNDARY
- BENCHMARK
- REPLACEMENT MONITORING WELL
- NORTH EXPANSION UNIT MONITORING WELL

NORTH EXPANSION UNIT
(CONSTRUCTION ONGOING)

NORTHERN UNIT

SOUTHERN UNIT

SOUTHERN UNIT EXPANSION

WINNEBAGO LANDFILL PROPERTY BOUNDARY

ENERGY RECOVERY PLANT AND OFFICE BUILDING

FIRE PROTECTION POND

GAS PROCESSING BUILDING

LINDENWOOD ROAD

COMMONWEALTH EDISON R.O.W.

KILBUCK CREEK

i = 0.01270

G185 693.98
G182 694.08
G180 696.49
G179 *698.63
G178 695.42
G177 693.78
G176 691.25
G175 691.04
G174 689.13
G173 687.63
G172 689.01
G171 691.01
G170 691.03
G169 691.19
G168 691.74
G50S DRY
G167 690.20
G52S (T4U-A) 698.59
G52M (T4L-A) 698.62
R183 693.93
G184 696.07
G18S *DRY
G18D 696.07
G37D 702.35
G37S 704.54
G17S DRY
G34D 702.54
G34S 703.75
G40S DRY
G51S 697.83
R39S 698.86
G16M 703.18
G16D 703.49
G35D 703.29
G35S 703.22
G41M 703.39 SGI
G41D 703.09
G41S 703.37
R03S 703.55
G03M 703.54
G33S NO ACCESS
G33D NO ACCESS
G38S 704.36
G36S 706.93
G130 707.04
R42S 708.58
G49D 709.92
R28D NA
R27D 710.71
G26S 711.10
G26D 711.03
R25D 712.00
R24D 712.49
G23D 713.42
G29D 716.01
G29S 713.05
G09D 721.75
G09M 722.43
R05S DRY
G20D 722.57
G13S 719.59
G13D 719.38
R11S 717.40
G11D 717.74
R22S* 727.64
G22D 718.14
SGJ

695 700 705 710 715 720

4Q10

POTENTIOMETRIC SURFACE MAP
4TH QUARTER 2010

PLANS PREPARED FOR
WINNEBAGO LANDFILL
ROCKFORD, WINNEBAGO COUNTY, ILLINOIS

DATE: DECEMBER 2010
PROJECT ID: 90-114
SHEET NUMBER:

ANDREWS ENGINEERING, INC.
3300 Ginger Creek Drive, Springfield, IL 62711-7233
Tel (217) 787-2334 Fax (217) 787-9495
Pontiac, IL • Naperville, IL • Indianapolis, IN • Warrenton, MO

APPROVED BY: MTH DESIGNED BY: MTH DRAWN BY: MPN

REVISIONS

NO.	DATE	DESCRIPTION	BY

E 798,500 E 799,000 E 799,500 E 800,000 E 800,500

N

200 0 200 400 800

SCALE: IN FEET

NOTES:
1. CONTOUR INTERVAL = 5 FEET
2. SAMPLE DATE = 7/15/2010.
3. (*) NOT USED IN THE COMPILATION OF THE POTENTIOMETRIC SURFACE.
4. THE NORTHERN AND SOUTHERN UNITS OF WINNEBAGO LANDFILL ARE OPERATED AND MONITORED IN ACCORDANCE WITH ILLINOIS EPA PERMIT NO. 1991-138-LF. THE NORTH EXPANSION UNIT OF WINNEBAGO LANDFILL IS OPERATED AND MONITORED IN ACCORDANCE WITH ILLINOIS EPA PERMIT NO. 2006-221-LF. THE DEPOSITS MONITORED BY ALL THREE WASTE UNITS ARE HYDRAULICALLY CONNECTED; THEREFORE, A SINGLE MAP DEPICTING THE GROUNDWATER FLOW REGIME HAS BEEN COMPILED.
5. IN THE CASE OF NESTED WELLS THE GROUNDWATER ELEVATIONS FROM SHALLOW WELLS WERE USED IN THE COMPILATION OF POTENTIOMETRIC CONTOURS.
6. POTENTIOMETRIC CONTOURS AS SHOWN ASSUME CONTINUOUS GEOLOGICAL CONDITIONS AND DO NOT ACCOUNT FOR LINER AND SIDEWALLS EMPLACED FOR DEVELOPMENT OF THE NORTH EXPANSION UNIT.

LEGEND

- SGX — STREAM GAUGE LOCATION
- NORTHERN UNIT GROUND WATER MONITOR WELL OR GMZ WELL
- SOUTHERN UNIT GROUND WATER MONITOR WELL
- CURRENTLY PERMITTED FILL BOUNDARY
- BENCHMARK
- REPLACEMENT MONITORING WELL
- NORTH EXPANSION UNIT MONITORING WELL

G185 693.42; G182 713.38; G180 695.71; G179 *667.77; G178 694.73; G177 693.47; G176 693.20; G175 680.74; G174 689.27; G173 688.03; G172 689.48; G171 691.22; G170 691.68; G169 691.82; G168 691.78; G167 698.32; G50S 698.76; G52S (T4U-A) 699.20; G52M (T4L-A) 699.12; R183 693.40; 712; 707; 702; 697; 692

NORTH EXPANSION UNIT
(CONSTRUCTION ONGOING)

WINNEBAGO LANDFILL PROPERTY BOUNDARY

ENERGY RECOVERY PLANT AND OFFICE BUILDING

FIRE PROTECTION POND

G184 697.27

G18S *703.64; G18D 696.37; G37D 702.56; G37S 705.35; G17S 699.05; G34D 703.09; G34S 704.31; KILBUCK CREEK

GAS PROCESSING BUILDING

G40S 699.36; G51S 698.05; R39S 699.26

LINDENWOOD ROAD

G16M 703.77; G16D 703.88; G35D 703.86; G35S 703.82; G41M 704.04; SG1; G41D 703.62; G41S 703.91; i = 0.01270

R03S 704.08; G03M 704.06

NORTHERN UNIT

G33S 706.17; G33D 708.82; G38S 704.93

G09M 722.82; G09D 723.19; R05S 723.38; G20D 723.49; G13S 720.57; G13D 720.26

SOUTHERN UNIT EXPANSION

G36S 707.35; G130 707.56; R42S 709.06; G49D 708.64; SG3; R28D 710.00; R27D 711.24; G26S 711.67; G26D 711.58; R25D 712.57; R24D 712.96; G23D 713.90; R11S 718.35; G11D 718.65; R22S* 728.75; G22D 718.84; KILBUCK CREEK; G29D 716.54; G29S 714.13; COMMONWEALTH EDISON R.O.W.

N 801,000; N 799,500; N 798,000

POTENTIOMETRIC SURFACE MAP
3RD QUARTER 2010

PLANS PREPARED FOR
WINNEBAGO LANDFILL
ROCKFORD, WINNEBAGO COUNTY, ILLINOIS

ANDREWS ENGINEERING, INC.
3300 Ginger Creek Drive, Springfield, IL 62711-7233
Tel (217) 787-2334 Fax (217) 787-9495
Pontiac, IL • Naperville, IL • Indianapolis, IN • Warrenton, MO

APPROVED BY: JLR | DESIGNED BY: JLR | DRAWN BY: MPN

REVISIONS

NO.	DATE	DESCRIPTION	BY

3Q10

DATE: SEPTEMBER 2010
PROJECT ID: 90-114
SHEET NUMBER:

N

200 0 200 400 800

SCALE: IN FEET

NOTES:
1. CONTOUR INTERVAL = 5 FEET
2. SAMPLE DATE = 4/14/2010-4/19/2010.
3. (*) NOT USED IN THE COMPILATION OF THE POTENTIOMETRIC SURFACE.
4. THE NORTHERN AND SOUTHERN UNITS OF WINNEBAGO LANDFILL ARE OPERATED AND MONITORED IN ACCORDANCE WITH ILLINOIS EPA PERMIT NO. 1991-138-LF. THE NORTH EXPANSION UNIT OF WINNEBAGO LANDFILL IS OPERATED AND MONITORED IN ACCORDANCE WITH ILLINOIS EPA PERMIT NO. 2006-221-LF. THE DEPOSITS MONITORED BY ALL THREE WASTE UNITS ARE HYDRAULICALLY CONNECTED; THEREFORE, A SINGLE MAP DEPICTING THE GROUNDWATER FLOW REGIME HAS BEEN COMPILED.
5. IN THE CASE OF NESTED WELLS THE GROUNDWATER ELEVATIONS FROM SHALLOW WELLS WERE USED IN THE COMPILATION OF POTENTIOMETRIC CONTOURS.
6. POTENTIOMETRIC CONTOURS AS SHOWN ASSUME CONTINUOUS GEOLOGICAL CONDITIONS AND DO NOT ACCOUNT FOR LINER AND SIDEWALLS EMPLACED FOR DEVELOPMENT OF THE NORTH EXPANSION UNIT.

LEGEND

- SGX — STREAM GAUGE LOCATION
- NORTHERN UNIT GROUND WATER MONITOR WELL OR GMZ WELL
- SOUTHERN UNIT GROUND WATER MONITOR WELL
- CURRENTLY PERMITTED FILL BOUNDARY
- BENCHMARK
- REPLACEMENT MONITORING WELL
- NORTH EXPANSION UNIT MONITORING WELL

NORTH EXPANSION UNIT
(CONSTRUCTION ONGOING)

NORTHERN UNIT

SOUTHERN UNIT

SOUTHERN UNIT EXPANSION

WINNEBAGO LANDFILL PROPERTY BOUNDARY

ENERGY RECOVERY PLANT AND OFFICE BUILDING

FIRE PROTECTION POND

GAS PROCESSING BUILDING

LINDENWOOD ROAD

COMMONWEALTH EDISON R.O.W.

KILBUCK CREEK

693 698 703 708 713 718 723

i = 0.01290

G52S (T4U-A) G52M (T4L-A) G50S 696.76 G18S 700.36 G18D 697.48 G37D 703.26 G37S 705.77 G17S 701.07 G34D 703.94 G34S 704.83 G40S 699.36 G51S 699.50 R39S 700.21 G16M 704.49 G16D 704.69 G35D 704.76 G35S 704.67 G41M 704.79 G41D 704.39 G41S 703.77 SG1 R03S 704.78 G03M 704.81 G33S 706.56 G33D 706.27 G38S 705.70 G36S 707.88 G13D 707.59 R42S 709.65 G49D 710.89 R28D 710.50 R27D 711.94 G26S 712.30 G26D 712.18 R25D 713.21 R24D 713.06 G23D 714.50 G29D 716.84 G29S 714.60 SG3 G09D 723.63 G09M 723.18 R05S 721.00 G13S 723.99 G13D 721.83 R11S 718.91 G11D 718.56 R22S* 730.05 G22D 719.39 G20D 724.79 G184 698.95 G182 691.21 G181 NA G180 689.38 G179 NA G178 NA G177 690.52 G176 692.11 G175 692.21 G174 689.42 G173 689.00 G172 692.18 G183 692.14

2Q10

POTENTIOMETRIC SURFACE MAP
2ND QUARTER 2010

PLANS PREPARED FOR
WINNEBAGO LANDFILL
ROCKFORD, WINNEBAGO COUNTY, ILLINOIS

DATE: JUNE 2010
PROJECT ID: 90-114
SHEET NUMBER:

ANDREWS ENGINEERING, INC.
3300 Ginger Creek Drive, Springfield, IL 62711-7233
Tel (217) 787-2334 Fax (217) 787-9495
Pontiac, IL • Naperville, IL • Indianapolis, IN • Warrenton, MO

APPROVED BY: JLR DESIGNED BY: JLR DRAWN BY: MPN

REVISIONS

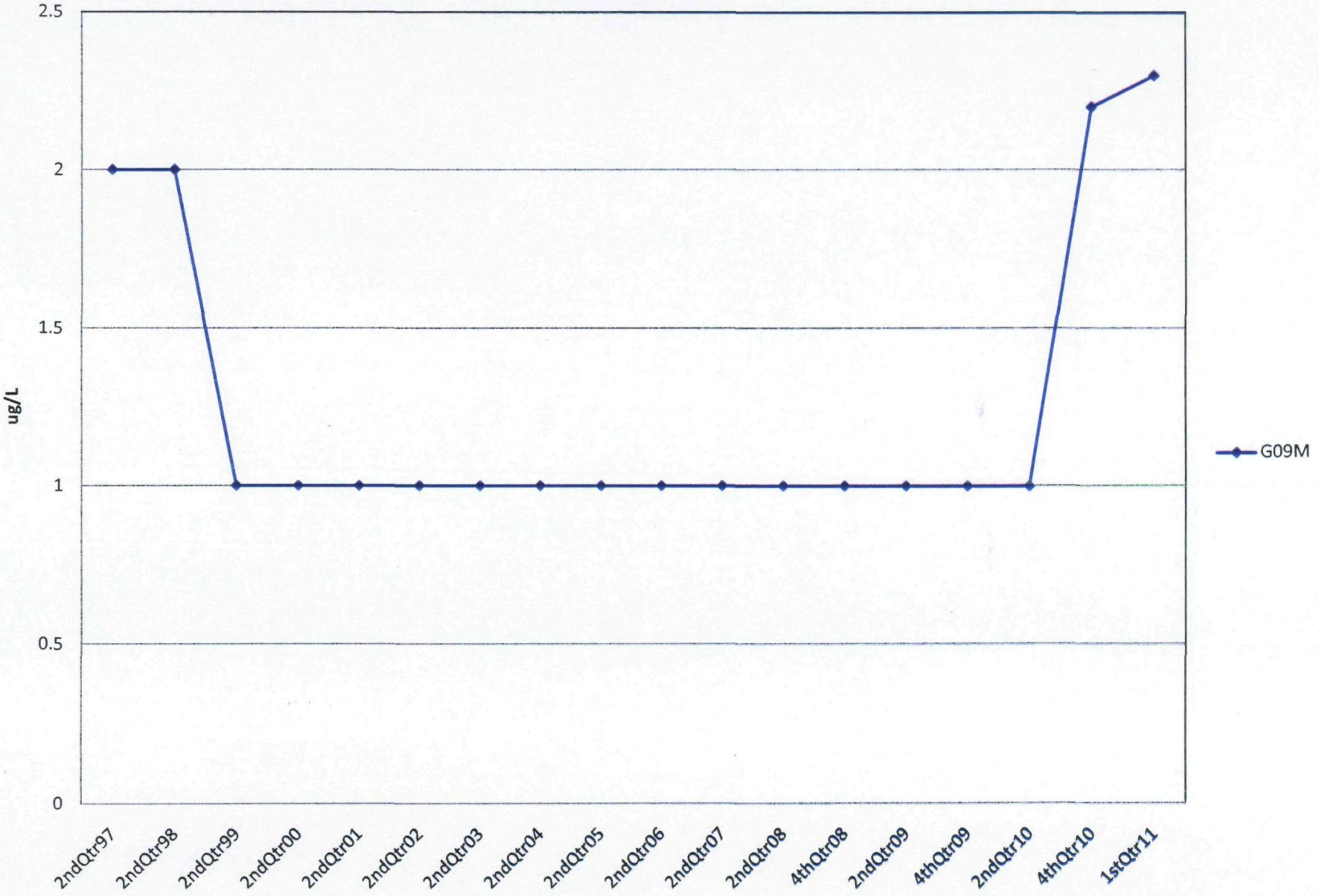
NO.	DATE	DESCRIPTION	BY

APPENDIX C

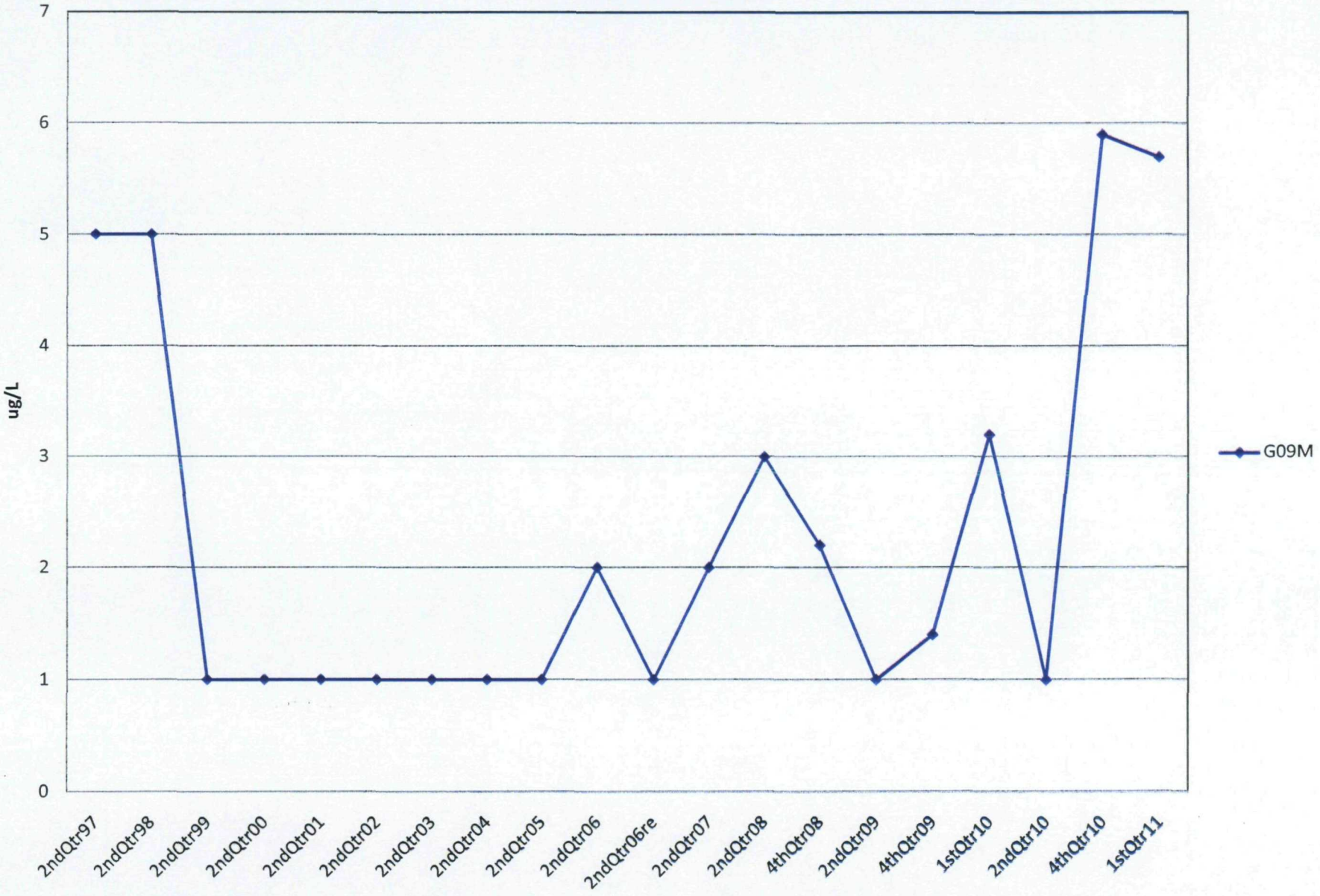
Graphical Trend Analyses

Winnebago Landfill
Northern Unit

Benzene

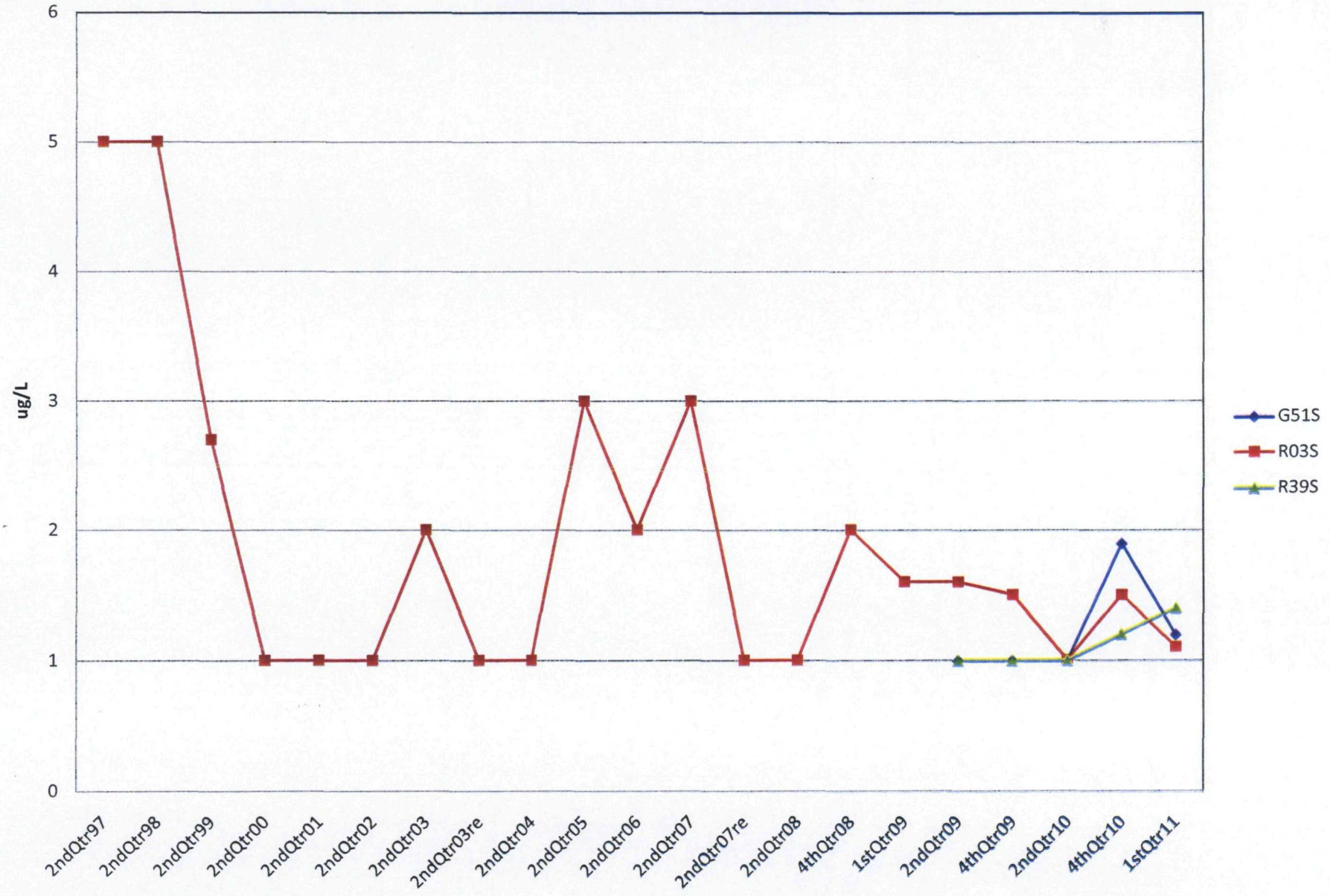


Winnebago Landfill
Northern Unit
Chlorobenzene



Winnebago Landfill
Northern Unit

Cis-1,2-Dichloroethene

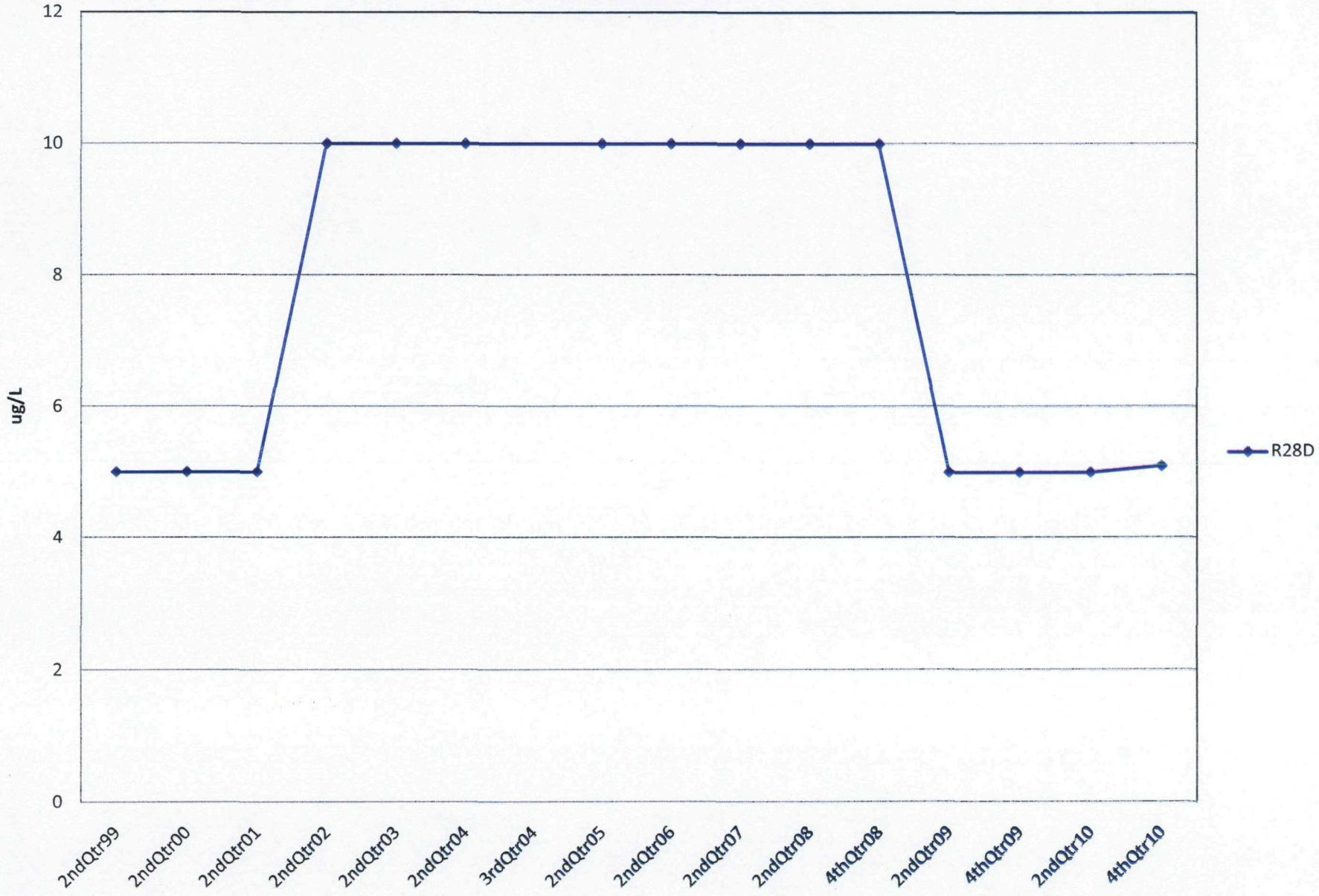


Andrews Engineering, Inc.

J:\1990\90-114\MON\Sig Mods\4Q10 ASD N&S\WRS 4Q10 ASD North Unit Tables and Graphs
cis12dce

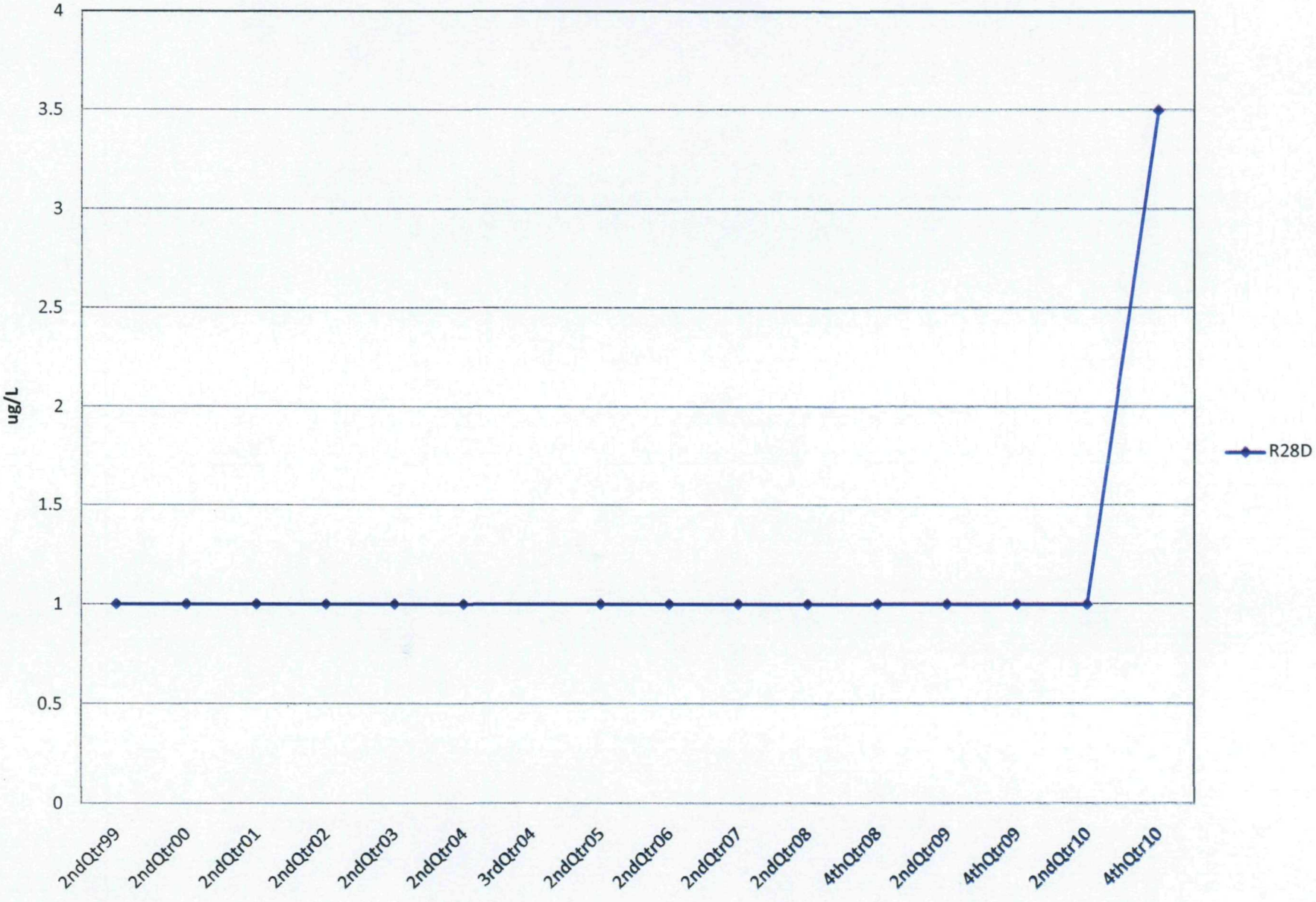
Winnebago Landfill
Southern Unit

Acetone



Winnebago Landfill
Southern Unit

Carbon Disulfide

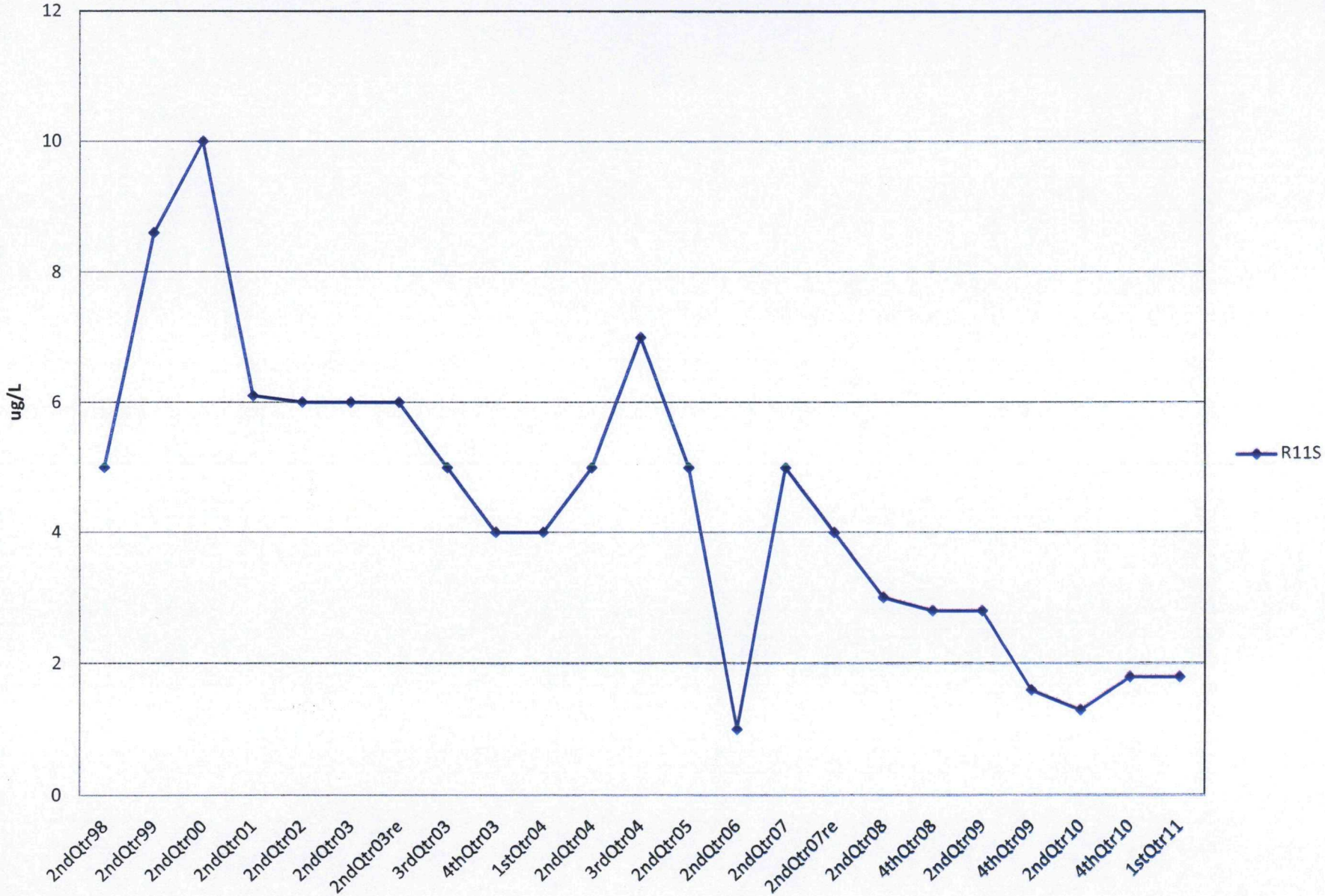


Andrews Engineering, Inc.

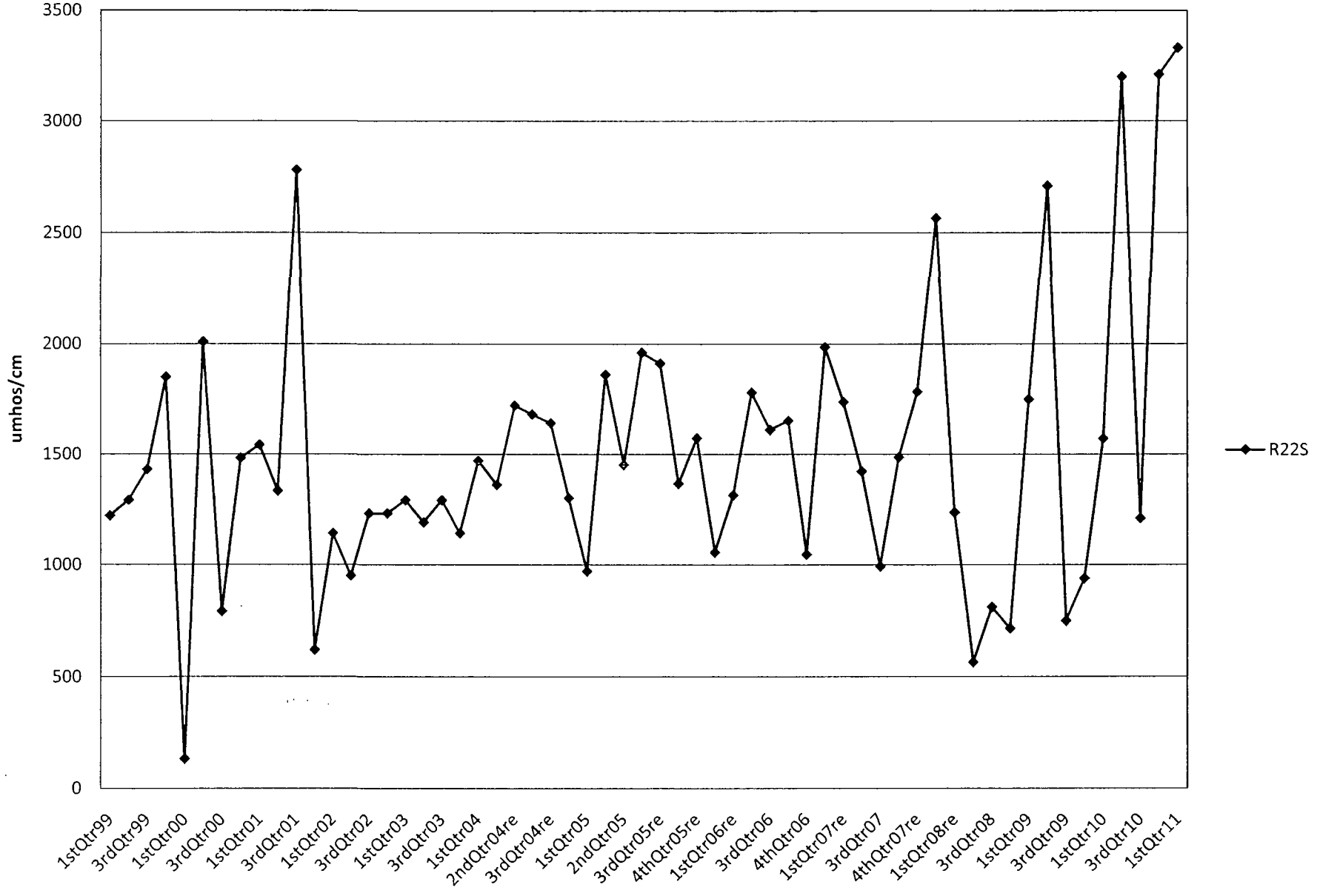
J:\1990\90-114\MON\Sig Mods\4Q10 ASD N&S\WRS 4Q10 ASD South Unit Tables and Graphs
Carbon disulfide

Winnebago Landfill
Southern Unit

Cis-1,2-Dichloroethene



Winnebago Landfill
Southern Unit
Specific Conductance



APPENDIX D

Field/Equipment Blank Analytical

PDC Laboratories, Inc.

2231 W. Altorfer Drive - Peoria, IL 61615
(309) 692-9688 - (800) 752-6651 - FAX (309) 692-9689

ACCREDITED IN ACCORDANCE WITH nelac

Laboratory Results

William Charles Waste Companies
5450 Wansford Way, Suite 201b

Rockford, IL 61109-1759
Attn : Evan Buskohl

Date Received : 10/08/10 15:26
Report Date 01/12/11
Customer # : 209324
P.O. Number : Pagel N-GW
Facility :

Sample No: **10102021-7** Collect Date **10/08/10 12:55**
Client ID : **NORTH UNIT** Site : **EQUIPMENT BLANK** Locator : **WINNEBAGO LF**

Parameter	Qualifier	Result	Analysis Date	Analyst
SW-846 8260B				
1,1,1,2-Tetrachloroethane	<	1 ug/l	10/18/10 11:26	JMB
1,1,1-Trichloroethane	<	1 ug/l	10/18/10 11:26	JMB
1,1,2,2-Tetrachloroethane	<	1 ug/l	10/18/10 11:26	JMB
1,1,2-Trichloroethane	<	1 ug/l	10/18/10 11:26	JMB
1,1-Dichloroethane	<	1 ug/l	10/18/10 11:26	JMB
1,1-Dichloroethene	<	1 ug/l	10/18/10 11:26	JMB
1,1-Dichloropropene	<	1 ug/l	10/18/10 11:26	JMB
1,2,3-Trichlorobenzene	<	1 ug/l	10/18/10 11:26	JMB
1,2,3-Trichloropropane	<	1 ug/l	10/18/10 11:26	JMB
1,2,4-Trichlorobenzene	<	1 ug/l	10/18/10 11:26	JMB
1,2,4-Trimethylbenzene	<	1 ug/l	10/18/10 11:26	JMB
1,2-Dichlorobenzene	<	1 ug/l	10/18/10 11:26	JMB
1,2-Dichloroethane	<	1 ug/l	10/18/10 11:26	JMB
1,2-Dichloropropane	<	1 ug/l	10/18/10 11:26	JMB
1,3,5-Trimethylbenzene	<	1 ug/l	10/18/10 11:26	JMB
1,3-Dichlorobenzene	<	1 ug/l	10/18/10 11:26	JMB
1,3-Dichloropropane	<	1 ug/l	10/18/10 11:26	JMB
1,3-Dichloropropene	<	1 ug/l	10/18/10 11:26	JMB
1,4-Dichlorobenzene	<	1 ug/l	10/18/10 11:26	JMB
2,2-Dichloropropane	<	1 ug/l	10/18/10 11:26	JMB
2-Butanone		39 ug/l	10/18/10 11:26	JMB
2-Chlorotoluene	<	1 ug/l	10/18/10 11:26	JMB
2-Hexanone		8.4 ug/l	10/18/10 11:26	JMB
4-Chlorotoluene	<	1 ug/l	10/18/10 11:26	JMB
4-Methyl-2-pentanone	<	5 ug/l	10/18/10 11:26	JMB
Acetone		58 ug/l	10/18/10 11:26	JMB
Acrylonitrile	<	5 ug/l	10/18/10 11:26	JMB
Benzene	<	1 ug/l	10/18/10 11:26	JMB
Bromobenzene	<	1 ug/l	10/18/10 11:26	JMB
Bromochloromethane	<	1 ug/l	10/18/10 11:26	JMB
Bromodichloromethane	<	1 ug/l	10/18/10 11:26	JMB
Bromoform	<	1 ug/l	10/18/10 11:26	JMB
Bromomethane	<	2 ug/l	10/18/10 11:26	JMB
Carbon Disulfide	<	1 ug/l	10/18/10 11:26	JMB
Carbon Tetrachloride	<	1 ug/l	10/18/10 11:26	JMB
Chlorobenzene	<	1 ug/l	10/18/10 11:26	JMB
Chloroethane	<	2 ug/l	10/18/10 11:26	JMB
Chloroform	<	1 ug/l	10/18/10 11:26	JMB
Chloromethane	<	2 ug/l	10/18/10 11:26	JMB
cis-1,2-Dichloroethene	<	1 ug/l	10/18/10 11:26	JMB
cis-1,3-Dichloropropene	<	1 ug/l	10/18/10 11:26	JMB
Dibromochloromethane	<	1 ug/l	10/18/10 11:26	JMB
Dibromomethane	<	1 ug/l	10/18/10 11:26	JMB
Dichlorodifluoromethane	<	1 ug/l	10/18/10 11:26	JMB
Ethylbenzene	<	1 ug/l	10/18/10 11:26	JMB
Hexachlorobutadiene	<	2 ug/l	10/18/10 11:26	JMB

PDC Laboratories, Inc.

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ACCREDITED IN ACCORDANCE WITH melac

Laboratory Results

William Charles Waste Companies
5450 Wansford Way, Suite 201b

Rockford, IL 61109-1759
Attn : Evan Buskohl

Date Received : 10/08/10 15:26
Report Date 01/12/11
Customer # : 209324
P.O. Number : Pagel N-GW
Facility :

Sample No: **10102021-8** Collect Date **10/08/10 13:00**
Client ID : **NORTH UNIT** Site : **FIELD BLANK** Locator : **WINNEBAGO LF**

Parameter	Qualifier	Result	Analysis Date	Analyst
SW-846 8260B				
1,1,1,2-Tetrachloroethane	<	1 ug/l	10/18/10 11:59	JMB
1,1,1-Trichloroethane	<	1 ug/l	10/18/10 11:59	JMB
1,1,2,2-Tetrachloroethane	<	1 ug/l	10/18/10 11:59	JMB
1,1,2-Trichloroethane	<	1 ug/l	10/18/10 11:59	JMB
1,1-Dichloroethane	<	1 ug/l	10/18/10 11:59	JMB
1,1-Dichloroethene	<	1 ug/l	10/18/10 11:59	JMB
1,1-Dichloropropene	<	1 ug/l	10/18/10 11:59	JMB
1,2,3-Trichlorobenzene	<	1 ug/l	10/18/10 11:59	JMB
1,2,3-Trichloropropane	<	1 ug/l	10/18/10 11:59	JMB
1,2,4-Trichlorobenzene	<	1 ug/l	10/18/10 11:59	JMB
1,2,4-Trimethylbenzene	<	1 ug/l	10/18/10 11:59	JMB
1,2-Dichlorobenzene	<	1 ug/l	10/18/10 11:59	JMB
1,2-Dichloroethane	<	1 ug/l	10/18/10 11:59	JMB
1,2-Dichloropropane	<	1 ug/l	10/18/10 11:59	JMB
1,3,5-Trimethylbenzene	<	1 ug/l	10/18/10 11:59	JMB
1,3-Dichlorobenzene	<	1 ug/l	10/18/10 11:59	JMB
1,3-Dichloropropane	<	1 ug/l	10/18/10 11:59	JMB
1,3-Dichloropropene	<	1 ug/l	10/18/10 11:59	JMB
1,4-Dichlorobenzene	<	1 ug/l	10/18/10 11:59	JMB
2,2-Dichloropropane	<	1 ug/l	10/18/10 11:59	JMB
2-Butanone		16 ug/l	10/18/10 11:59	JMB
2-Chlorotoluene	<	1 ug/l	10/18/10 11:59	JMB
2-Hexanone		7.5 ug/l	10/18/10 11:59	JMB
4-Chlorotoluene	<	1 ug/l	10/18/10 11:59	JMB
4-Methyl-2-pentanone	<	5 ug/l	10/18/10 11:59	JMB
Acetone		65 ug/l	10/18/10 11:59	JMB
Acrylonitrile	<	5 ug/l	10/18/10 11:59	JMB
Benzene	<	1 ug/l	10/18/10 11:59	JMB
Bromobenzene	<	1 ug/l	10/18/10 11:59	JMB
Bromochloromethane	<	1 ug/l	10/18/10 11:59	JMB
Bromodichloromethane	<	1 ug/l	10/18/10 11:59	JMB
Bromoform	<	1 ug/l	10/18/10 11:59	JMB
Bromomethane	<	2 ug/l	10/18/10 11:59	JMB
Carbon Disulfide	<	1 ug/l	10/18/10 11:59	JMB
Carbon Tetrachloride	<	1 ug/l	10/18/10 11:59	JMB
Chlorobenzene	<	1 ug/l	10/18/10 11:59	JMB
Chloroethane	<	2 ug/l	10/18/10 11:59	JMB
Chloroform	<	1 ug/l	10/18/10 11:59	JMB
Chloromethane	<	2 ug/l	10/18/10 11:59	JMB
cis-1,2-Dichloroethene	<	1 ug/l	10/18/10 11:59	JMB
cis-1,3-Dichloropropene	<	1 ug/l	10/18/10 11:59	JMB
Dibromochloromethane	<	1 ug/l	10/18/10 11:59	JMB
Dibromomethane	<	1 ug/l	10/18/10 11:59	JMB
Dichlorodifluoromethane	<	1 ug/l	10/18/10 11:59	JMB
Ethylbenzene	<	1 ug/l	10/18/10 11:59	JMB
Hexachlorobutadiene	<	2 ug/l	10/18/10 11:59	JMB

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Laboratory Results

William Charles Waste Companies
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Rockford, IL 61109-1759
Attn : Evan Buskohl

Date Received : 10/08/10 15:26
Report Date 01/12/11
Customer # : 209324
P.O. Number : Pagel N-GW
Facility :

PDC Laboratories participates in the following accreditation/certification and proficiency programs at the following locations. Endorsement by the Federal or State Government or their agencies is not implied.

PIA PDC Laboratories - Peoria, IL
NELAC Accreditation for Drinking Water, Wastewater, Hazardous and Solid Wastes Fields of Testing through IL EPA Lab No. 100230
State of Illinois Bacteriological Analysis in Drinking Water Certified Lab Registry No. 17553
Drinking Water Certifications: Indiana (C-IL-040); Kansas (E-10338); Missouri (00870); Wisconsin (998294430)
Wastewater Certifications: Arkansas; Iowa (240); Kansas (E-10338); Wisconsin (998294430)
Hazardous/Solid Waste Certifications: Arkansas; Kansas (E-10338); Wisconsin(998294430)
UST Certification: Iowa (240)

SPMO PDC Laboratories - Springfield, MO
EPA DMR-QA Program

STL PDC Laboratories - St. Louis, MO
NELAC Accreditation for Wastewater, Hazardous and Solid Wastes Fields of Testing through IL EPA Lab No. 100253.

Certified by: Gail D Schindler
Gail Schindler, Project Manager

APPENDIX E

Statistical Method

Statistical Analyses Method

References:

1. 35 Illinois Administrative Code 811.320
2. "Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Interim Final Guidance." Office of Solid Waste, USEPA, April 1989.
3. "Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Addendum to Interim Final Guidance." Office of Solid Waste, USEPA, July 1992.
4. "Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Addendum to Interim Final Guidance." Office of Solid Waste, USEPA, January 1993.

Background quality shall be determined using the statistical techniques set forth in 35 IAC 811.320(e). The data was tested for normality using the Shapiro-Wilk normality test. If the data was found not to follow a normal distribution, a nonparametric statistical method was utilized. The data was examined for outliers by the method described in the "Statistical Analysis of Ground-Water Monitoring, Interim Final Guidance and Addendum to Interim Final Guidance." After the outlier test the percentages of non-detect values (NDs) shall be calculated for each parameter to determine the applicable ND treatment method, if any. Once the treatment of non-detect values is done, the prediction limit for each parameter shall be calculated using the mean, standard deviation, and the appropriate t value. The statistical analysis uses a one-tailed test to determine an upper limit of significance. The upper prediction limit shall be the concentration for the probability that the constituent can be measured without constituting a statistical increase above the background. Any concentration found below this limit is regarded as falling within the normal statistical population.

Statistical Method

The statistical method shall employ the 99% confidence limit (99% CL) for all interwell calculations and the 99% confidence limit (99% CL) for all intrawell calculations, which incorporates the mean, standard deviation, number of samples, and the Student's t value in the calculation of a confidence limit to determine general background groundwater quality. An upper confidence limit shall be calculated for each individual chemical parameter. The well data from the site shall be evaluated statistically with samples collected during four (4) consecutive quarters of background sampling.

Handling of Outliers

Prior to statistical analyses the data set was evaluated for outliers. Outliers are defined as data points that vary significantly from the mean value for that data set. Outliers may represent

sampling error, contamination from surface run-off, analytical laboratory error, or anomalous site conditions. Outliers, if not removed from the data set, can erroneously increase the AGQS and minimize the occurrence of an exceedences related to a release from a waste unit. Once a statistical outlier has been identified, the concentrations shall be evaluated to determine the cause. If a valid reason has been determined for the outlier the data point will be removed from the data set. If no specific reason can be documented the point will considered representative and included in the analysis. Statistical analysis will then be conducted as described below.

Handling of Non-Detects (NDs)

Non-detect values (NDs) were handled according to the percentage of Non-Detects (%ND) present in the background sampling. The %ND was calculated for each parameter from the pooled background data of each well set. The data treatment was done according to the following criteria:

a) For under 0% NDs, no adjustment is made to the values in the data set.
b) For under 15% NDs, the value of one-half (½) the reported Detection Limit (DL) was substituted for the ND value, and the mean and standard deviation were calculated using detected values with the substituted ND values.
c) For 15-50% NDs, Cohen's Adjustment was used to adjust the mean and standard deviation. The adjusted mean and standard deviation was then used to calculate the Confidence Limit.
d) For over 50% but not 100% NDs, the highest recorded concentration was substituted for the prediction limit.
e) For 100% NDs, the Method Detection Limit (MDL) will be substituted for the ND value. The mean and standard deviation was calculated using the substituted ND values.

Confidence Limit

The statistical procedure was conducted according to the following steps:

1. Calculate arithmetic mean

The arithmetic mean was calculated using the pooled data for each parameter. The arithmetic mean (X_b) was calculated using the following equation:

$$X_b = \frac{X_1 + X_2 + \ldots + X_n}{n}$$

where: X_b = Average background value
X_n = Individual background value for *n* sample
n = Number of background values

2. Calculate standard deviation

The standard deviation was calculated using the pooled data for each parameter. The standard deviation was calculated using the following equation:

$$S_b = \sqrt{\frac{(X_1 - X_b) + (X_2 - X_b) + \ldots + (X_n - X_b)}{n-1}}$$

where: S_b = Population standard deviation
X_n = Individual background value for *n* sample
X_b = Mean (1)
n = Number of background samples

3. Calculate the 99% Upper Confidence Limit (Intrawell Values)

The 99% Upper Confidence Limit was calculated for each parameter using the mean (1), the standard deviation (2), the number of background samples, and the Student's t value given for $\sigma = 0.01$ (99% Confidence). The Student's t value varies upon the number of background samples. For those parameters with greater than 50% but not 100% NDs, the Cohen Method was utilized to calculate the 99% Confidence Limit. The methodology described in "Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities: Addendum to Interim Final Guidance" dated January 28, 1993 was used to calculate the Cohen Confidence Limit. The 99% Upper Confidence Limit for the remaining parameters was calculated using the following equation:

$$CL = X_b + \_ S_b \bullet t \bullet \sqrt{1 + \frac{1}{n}}$$

where: CL = Upper Confidence Limit (Upper and Lower for pH)
X_b = Mean (1)
S_b = Standard Deviation (2)
t = Student's t value at 0.01 significance (99% Confidence)
n = Number of background samples

4. Calculate the 99% Upper Confidence Limit (Interwell Values)

The 99% Upper Confidence Limit was calculated for each parameter using the mean (1), the standard deviation (2), the number of background samples, and the Student's t value given for $\sigma = 0.01$ (99% Confidence). The Student's t value varies upon the number of background samples. For those parameters with greater than 50% but not 100% NDs, the Cohen Method was utilized to calculate the 99% Confidence Limit. The methodology described in "Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities: Addendum to Interim Final Guidance" dated January 28, 1993 was used to calculate the Cohen Confidence Limit. The

99% Upper Confidence Limit for the remaining parameters was calculated using the following equation:

$$CL = X_b +\_ S_b \bullet t \bullet \sqrt{1 + \frac{1}{n}}$$

where: CL = Upper Confidence Limit (Upper and Lower for pH)
X_b = Mean (1)
S_b = Standard Deviation (2)
t = Student's t value at 0.01 significance (99% Confidence)
n = Number of background samples

APPENDIX F

Statistical Calculations

Winnebago Landfill
Southern Unit
Intrawell AGQS Statistics
R22S

Raw Data

Parameter	Units	2ndQtr10	3rdQtr10	4thQtr10	1stQtr11	Normal Distribution	Nonparametric Upper Prediction Limit**
R22S							
Specific Conductance	umhos/cm	3,200	1,209	3,210	3,330	No	3,330

Notes:
*Shapiro-Wilk utilized to test for normality
**The maximum value was utilized as the nonparametric upper Prediction limit